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THE SPONGES OF WOODS HOLE AND ADJACENT WATERS

BY M. W. DE LAUBENFELS

WITH THREE PLATES

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No. 1.—*The Sponges of Woods Hole and Adjacent Waters*

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INTRODUCTION

The purpose of this article is not only a matter of general record, but also, in some measure, expressly to serve the needs of biologists who are studying in the vicinity of Woods Hole, Massachusetts. About a dozen species of sponge are already known to occur there, and these require emphasis. Other species have been recorded from the North Atlantic seacoast, and almost any of these may be expected to occur, sooner or later, at Woods Hole, wherefore some reference is also made to them here. In both cases, however, attention is given to those from depths less than 100 meters, rather than to those that occur only at greater profundity.

In pursuance of this purpose, there are two parts to the treatment employed: First, an account, with detailed descriptions, illustrations, and a key to the known and highly probable species of Woods Hole itself. Second, an annotated review of the literature references to sponge occurrences from Newfoundland at the north to the Carolinas at the south.

The author has studied the sponges of Woods Hole in the field at various times, from 1924 to 1946. A collection, upon which descriptions are here based, was made in 1946 by Dr. D. H. Zinn, who was at that time naturalist in charge of collecting there. This collection is deposited in the Museum of Comparative Zoölogy.

METHODS

A sponge specimen should be studied, if possible, while still alive, with record of its color and appearance then. This has seldom been done in the past, but it is to be hoped that future descriptions will include such data.

Sponges should be preserved by being plunged rapidly into 95% alcohol. After a few hours they should be lifted out, the dirty alcohol (with sea water precipitates and organic solutions) should be removed, the jar rinsed, and the specimen replaced in fresh alcohol; this time it can be 70%. If alcohol is not available, the specimen should be rapidly dried. Under no circumstances should formalin be used as it has an unexplained but disastrous effect upon many sponges, inducing maceration.

The specimen should be further studied with hand lens, or better—with the dissecting microscope. One looks for the following items:

Shape. Size. Color. Consistency.

Surface shape, oscules and pores.

Ectosome anatomy, such as presence of cortex, of extensive subdermal spaces, or any other dermal specialization.

Endosome anatomy, especially fibers (if any) and placement of spicules.

Skeleton. This is extremely important, so that much attention must be given to it.

Slices may be cut by hand from alcohol hardened sponge specimens. With a fresh, sharp safety-razor blade these sections can be cut as thin as 50 microns. Such is the cavernous nature of Porifera that only in a few cases (or for special histological study) are thinner sections required. One should have one thin section of the surface (tangential) and a similar one of the lining of the cloaca if such a cavity is present. One should have two or three sections perpendicular to, but including the surface.

Leave the sections lying on the slide (or slides) and apply reagents with medicine droppers, then remove each reagent with absorbent (tissue) paper. These reagents should be used:

1. Safranin in 95% alcohol.
2. Carbol-xylene (Perhaps repeat this).
3. Xylene.
4. Balsam, if a permanent mount is desired.

Apply a cover slip and study with the compound microscope. In xylene or balsam, if the slide is thoroughly cleared (dehydrated) the spicules *and their placement* should be evident.

Calcareous spicules may be recognized by the fact that some or most of them are smooth triaxons (three rays from a central point). If proof is needed, one may use HC1, in which calcareous spicules dissolve but siliceous ones do not.

GLOSSARY OF TERMS

acantho: a prefix meaning spiny, or thorny.
aniso: a prefix meaning unequally ended (or otherwise unequal).
chela: a type of microsclere; see figure 1A.
anatriaene: a tetraxon spicule with clads curved back toward the rhabd, like grapnels.
bipocilli: a type of microsclere; see figure 1C.
centrotylote: with a central, ball-shaped swelling.
clads: when a polyaxon spicule has one ray distinctly different from the others, that one is called the *rhabd* and the others are called *clads.*
euaster: a star-shaped spicule with no centrum.
iso: a prefix meaning equi-ended (or otherwise equal).
megascelere: a spicule that plays a large part in the structure of the sponge skeleton, or one that resembles those that ordinarily so function.
microsclere: a spicule that is either relatively small, or else is distinctly different from those that are regarded as being megascleres; microscleres never play a large part in the framework of the sponge.
monaxon: an unbranched spicule.
orthotriaene: a tetraxon spicule with clads perpendicular to the rhabd.
oxea: a monaxon spicule that is sharp pointed at both ends.
plagiotriaene: an orthotriaene with very thick clads.
protriaene: a tetraxon spicule with clads bent away from the rhabd, as in a pitchfork.
raphide: a straight monaxon microsclere.
rhabd: see the preceding definition of a *clad.*
spheraster: a star-shaped spicule with a spherical centrum from which the branches radiate.
spiraster: a spiral monaxon microsclere that is acanthose.
sigma: spiral, or "S", or "C" shaped spicules.
strongyle: a monaxon spicule rounded at both ends.
style: a monaxon spicule rounded at one end, sharp-pointed at the other.

tetraxon: a spicule that consists of four rays diverging from a common center.

toxa: a microsclere shaped like an archer's bow.

triaxon: a spicule that consists of three rays diverging from a common center.

tylo: a prefix indicating a rounded or ball-shaped structure; see the following for example.

tylostyle: a monaxon spicule sharp-pointed at one end, but with the other end swollen or ball-shaped.

From the following table and other data one may note the following distributional relationships:

1. Woods Hole species that are primarily northern, being thus near their southern limit, include:

Haliclona oculata, Halichondria panicea, Scypha lingua and *Leucosolenia cancellata.* Further south there are many other species of *Haliclona,* but *cancellata* is replaced by *Leucosolenia canariensis.*

2. Woods Hole species that are primarily southern, being thus near their northern limit, include none at all. A sharp faunal separation occurs in New Jersey, where there are few sponges of any kind.

3. Woods Hole species that are distinctive, being common there, but rare both north and south include:

Haliclona palmata and *Microciona prolifera.* Of these, *palmata* occurs also in Europe, *prolifera* also in Carolina.

4. *Cliona celata* is common north, south and around the world, as well as at Woods Hole.

5. *Haliclona permollis* is common both north and south of Woods Hole, also around the world, therefore should be expected to occur at Woods Hole. Almost as much may be said of *Hymeniacidon heliophila.*

List of sponges known to occur between Newfoundland and Carolina, at 100 meters depth, or less. The order is that used in de Laubenfels 1936 monograph of the Porifera. Abundance is indicated by +, uncommon occurrence by —. For species numbers 38 and 39, "V" indicates record by Verrill, not Procter.

		Also Arctic	Lambe, Newfoundland	Procter, Maine	Sumner, Osburn and Cole, Woods Hole	Zinn Collection, Woods Hole	George and Wilson, Beaufort, N. Car.	Also West Indian
1	*Ircinia fasciculata*						−	+
2	*Aplysilla sulfurea*						−	+
3	*Pleraplysilla latens*						−	
4	*Haliclona permollis*	−	+	+			+	−
5	*Haliclona oculata*			+	+	+		
6	*Haliclona palmata*				+	+		
7	*Isodictya palmata*		+	−				
8	*Xytopsues griseum*						−	+
9	*Orina arcoferus*	+	−					
10	*Sigmadocia flagellifer*	+	−					
11	*Pellina sitiens*	+	+	+				
12	*Rhizochalina oleracea*						−	+
13	*Iophon nigricans*		+	+				
14	*Lissodendoryx isodictyalis*						+	+
15	*Myxilla incrustans*	−	−	−				
16	*Tedania suctoria*	−		−				
17	*Microciona prolifera*		−	−	+	+	+	
18	*Mycale lingua*	+	−	−				
19	*Carmia fibrexilis*				−			
20	*Mycalecarmia ovulum*			−				
21	*Neosperiopsis deichmanni*			−		−		
22	*Biemna varianta*	+	−					
23	*Calyxabra poa*						−	
24	*Higginsia coralloides*						−	+
25	*Halichondria panicea*	+	+	+	+	+		
26	*Cladocroce ventilabrum*	−		−				
27	*Hymeniacidon heliophila*	−		−			+	−
28	*Choanites ficus*	−	−	−	−			
29	*Polymastia robusta*		−	−	−			
30	*Polymastia andrica*		−	−				
31	*Suberitechinus hispidus*		−	+				
32	*Suberites domunculus*					+		
33	*Spheciospongia vesparia*						−	+
34	*Cliona celata*		+	+	+	+	+	
35	*Topsentia genitrix*	−		−				
36	*Craniella crania*					−	−	
37	*Grantia canadensis*		−					
38	*Scypha lingua*	−		V	+	+		
39	*Leucosolenia cancellata*		−	V	+	+		

Key to some of the Species of Sponges already recorded from Woods Hole, or most likely to be found there

1. Sponges with calcareous spicules. Structure of sponge simple, tubular, or urn-shaped 2
   Sponges with siliceous spicules. Structure of sponge more complex 3
2. Sponge forming masses of simple cylindrical tubes (Ascon-type). *14. *Leucosolenia cancellata* Verrill (p. 28)
   Sponge developed as urn-shaped bodies, single or several together in clusters . . . . . *13. *Scypha lingua* (Haeckel) (p. 27)
3. Sponge obviously boring, forming narrow channels in calcareous material, musselshells, etc. . . . . *11. *Cliona celata* Grant (p. 23)
   Sponge not boring 4
4. Color bright red or violet 5
   Color various shades of yellowish brown 6
5. Color bright red. *4. *Microciona prolifera* (Ellis & Solander) (p. 12)
   Color violet . . . . . 3. *Haliclona permollis* (Bowerbank) (p. 11)
6. Spicules predominantly simple oxea (with or without other types 7
   Spicules predominantly pin-shaped tylostyles with or without other types, or distinctly divided into megascleres and microscleres 10
7. Structure of sponge radiate. Spicules simple oxeas and in addition either fork-shaped protriaenes or a few anatriaenes or small S-shaped spirasters . . . . . *12. *Craniella crania* (Müller) (p. 25)
   Structure of sponge not radiate 8
8. Encrusting form with a tendency to separate the outer "skin" from the deeper layer. Color more or less orange. Simple oxeas with a great diversity of size. *7. *Halichondria panicea* (Pallas) (p. 17)
   More or less branching forms. Simple oxeas of rather uniform size and forming a network 9
9. Colonies of finger-shaped branches, often reaching considerable height. Oxeas medium size. *1. *Haliclona oculata* (Linnaeus) (p. 9)
   Colonies with less tendency to form finger-shaped branches. Oxeas extremely small. *2. *Haliclona palmata* (Ellis & Solander) (p. 10)
10. Megascleres present as styles, microscleres in the form of anisochelas . . . . . 5. *Carmia fibrexilis* (Wilson) (p. 14)

Principal spicules as styles 11
11. Styles and peculiar microscleres.
*6. *Neosperiopsis deichmanni* de Laubenfels (p. 15)
Chiefly pin-shaped tylostyles 12
12. Surface of sponge covered with tube-shaped fistules, or warty. . 13
Surface smooth 14
13. Tube-shaped fistules present on surface.
10. *Polymastia andrica* n. n. (p. 22)
Surface of sponge warty. Color bright yellow.
*11. *Cliona celata* Grant (p. 23)
14. Pin-shaped tylostyles alone. Color yellow or orange.
*9. *Suberites domunculus* (Oliviv) (p. 21)
Pin-shaped tylostyles and minute centrotylote strongyles. Color grayish, possible pink tints.
8. *Choanites ficus* (Pallas) (p. 19)

The ten with asterisks represent those collected by Zinn.

Systematic Discussion

Class DEMOSPONGIAE
1936, p. 6[1]

Order HAPLOSCLERINA
1936, p. 33

Family HALICLONIDAE
1936, p. 37

Genus HALICLONA Grant
1936, p. 38

1. Haliclona oculata (Linnaeus)
Fig. 4 and 5

Spongia oculata Linnaeus, 1759, p. 1348.

Specimen described. No. 6908, M.C.Z.

Description. Typically the sponge consists of a short slender stalk which gives rise to many branches, often of greater diameter than the stalk. These branches may occasionally branch again, and now and then form anastomoses. The cross section of the branches may be circular,

[1] The quotation 1936, followed by a page number, refers to de Laubenfels monograph.

oval, or even greatly flattened. Here and there semi-incrusting sponges are found, resembling *oculata* in various respects; it is, however, not clear whether they represent a separate species or not. The typical colonies have branches nearly 10 mm. in diameter, often more than 20 cm. long (smaller individuals have been observed with branches scarcely 5 mm. thick, possibly caused by adverse conditions). The color is dull yellow or yellow-drab. Consistency, spongy and flexible. Surface minutely verrucose. Pores, abundant and minute, but not quite microscopic. Oscules, 1–2 mm. in diameter, about 2 cm. apart, usually without raised rim. Ectosome, notably absent (an important character of the genus *Haliclona*). Endosome, consisting of a rather homogenous ground substance, which under the microscope shows an isodictyal reticulation with spicules that are connected to each other at their ends only, by minute amounts of spongin. Through this ground substance run branching canals, visible to the naked eye, and a loose reticulation of spongin fibers can be traced. The flagellate chambers are, of course, abundantly distributed throughout the entire endosome.

Skeleton: Only one type of spicule is present; it is amazingly constant in size. The normal dimensions are 6 by 120 microns. These spicules are often cemented together by spongin at their tips to make an isodictyal reticulation. Spongin fibers are also present, containing about three rows of embedded spicules. These fibers form likewise an irregular but definite reticulation.

Type. Lost.

Type locality. European waters.

Remarks. Linnaeus' species was made the type species of *Haliclona* by Grant in 1841, p. 5. About twenty years later, Bowerbank changed this name to *Chalina*, and unfortunately many have followed him herein, but the change was quite unjustified.

Haliclona oculata is abundant in European waters as well as in those of New England. It is quite possible that specimens from various other parts of the world really represent *oculata*, although they have been assigned to other species. A revision of the entire genus *Haliclona* is urgently needed.

2. Haliclona palmata (Ellis & Solander)
Fig. 6 and 7

Spongia palmata Ellis & Solander, 1786, p. 189, pl. 58, fig. 6.

Specimen described. No. 6909, M.C.Z.

Description. Branching form with a relatively broad base, and small, finger-like branches 3–7 mm. in diameter and 3–7 cm. long.

(All the specimens from Woods Hole examined in this connection have measured less than 3 cm. in height). Color yellowish-drab, like *oculata*, sometimes a more orange shade. Consistency, flexible, spongy, as *oculata*. Surface, similarly verrucose (as in all members of *Haliclona*). Pores, minute, abundant, scattered. Oscules, small, 1–3 mm. in diameter, without raised collars or rims, scattered very irregularly. Ecotosome, absent. Endosome with principally isodictyal reticulation, but with some vague reticulation of spicule-filled fibers.

Skeleton: Spicules differing from other members of *Haliclona* in being of exceptionally small size, measuring 2 by 55 to 3 by 60 microns. In the fibers (which may measure as much as 40 microns in diameter) the core of embedded spicules is often only one third of the total diameter of the fiber, the rest being spongin. *H. palmata* has relatively more fibro-reticulation than *oculata*, and the ground-work of isodictyal mesh is less neatly symmetrical, more irregularly developed.

Type. Lost.

Type locality. Brighthelmstone, Sussex, England.

Remarks. H. palmata has a very similar geographical and ecological distribution to *oculata*. It has, of course, long been treated as a "*Chalina*"; it is now, for the first time, transferred to *Haliclona*.

3. Haliclona permollis (Bowerbank)

Isodictya permollis Bowerbank, 1866, pp. 273, 278.
Reniera tubifera George and Wilson, 1921, p. 145.

Description. Typically encrusting, but may grow up into solid, or more often, hollow branches. These latter are apt to be only 5–6 mm. in diameter. The color of a healthy specimen is a very distinctive lavender; obviously dead or dying specimens are dull pale brown, and occasionally one meets apparently healthy specimens of this same shade, but such occurrences are probably pathological. In some specimens green algae are present as symbionts, and in that case the color becomes blue. The consistency is very soft, as indicated by the name. The surface is superficially smooth, though actually minutely irregular. The pores are microscopic and abundant. The oscules are conspicuous, 1–5 mm. in diameter, and usually have raised walls or collars around them. In still water these collars grow very high and thus lead to the hollow tube proliferation mentioned above. The ectosome is notably devoid of specialization; there is no separable dermis, nor extensive subdermal cavity. The endosome consists primarily of an isodictyal

reticulation with only a little spongin, and that confined to the interspicular nodes. Here and there some spicules are aggregated into fascicular tracts that simulate fibers. The spiculation consists of simple oxeas only; these are about 7 by 150 microns long, ranging from 6 by 130 to 8 by 170 microns.

Type. Lost.

Type locality. Scarsborough, England.

Remarks. The species is extremely common in North Carolina, where the author examined numerous specimens in 1946. It is probably worldwide in distribution and thrives in greatest numbers in waters as cool as those of Massachusetts, and in such surroundings it reaches its largest size, much more than in the somewhat warmer water which characterizes North Carolina. Thus it is a dominant coastal species on the Pacific coast of the United States, which has cooler water than the Carolinas. It is therefore preposterous to conclude that it is really absent from the Woods Hole region, and it should certainly be sought with every expectation of discovery at or near that locality.

Order POECILOSCLERINA
1936, p. 60

Family MICROCIONIDAE
1936, p. 104

Genus MICROCIONA Bowerbank
1936, p. 111

4. Microciona prolifera (Ellis & Solander)
Fig. 8, 9, and 10

Spongia prolifera Ellis & Solander, 1786, p. 189.

Specimen described. No. 6907, M.C.Z.

Description. Often encrusting, especially when growing intertidally; in that case the colonies may be less than 1 mm. thick though covering areas as large as the human hand. When growing in locations where the colony rarely is exposed to air, lobes may develop, forming elaborate bush-like branches, the more elaborate, the lesser the current. In comparatively quiet waters, at about maximum depth—that is, about 5 meters—a very symmetrical shape replaces the irregular knobby branches. The extreme perfection of the species reached under such

ideal conditions is a finger-sized base from which a large mass of sponge structure is held erect. The sponge mass consists of vertical but thin and wide branches which form a number of rectangular cubicles, open above and below. The walls are less than 1 mm. thick, the diameter of the individual cubicles slightly over 1 cm. and the height of the walls about 1.5 cm. Where lumpy, irregular branches are developed, these may reach a thickness of 4 mm. in diameter and a height of 6 cm.

The color of the sponge is in life a distinctive bright red; dead specimens turn dull pale drab and occasionally such a specimen may be found in the field, perhaps indicating a pathological or even moribund condition. Consistency, tough and elastic. Surface, microscopically hispid. To a keen eye, or by using a hand lens, the sponge may appear to resemble velvet. Pores, microscopic, scattered, abundant. Oscules, small, often difficult to discover. Ectosome with some dermal specialization of the skeleton (see under the latter). Endosome contains many plumose tracts which occasionally branch and anastomose, making a kind of reticulation through the interior of the sponge. These structures may even be called fibers, as they do contain spongin. They are said to be plumose because they bristle with projecting spicules that are situated with the points directed toward the surface of the sponge.

Skeleton: Five different types of spicules are present: (1) thin, typical tylostyles, straight and about 1 by 100 to 5 by 150 microns, occurring chiefly at the surface (erect) or between the fibers; (2) tylostyles, with small heads, so that the greatest diameter of the spicule may exceed that of the head; these spicules constitutes the bulk of the skeleton in all members of this genus, filling the fibers and protruding from them. In the specimen described here, they measure mostly about 7 by 175 microns, but in other specimens they have occasionally been smaller and, more frequently, larger. In the literature an extreme of 16 by 500 microns is recorded, but a length of 9 by 280 is more commonly encountered; (3) acanthostyles, measuring 7 by 90 microns; although rare in *Microciona*, they must be regarded as forming a typical element of the spiculation; it is difficult to assign any particular location to them, but they represent a type which is to be expected as echinating spicules; (4) microscleres, as toxas, ranging from 10–40 microns in length; fairly common in some specimens, while in other cases it is almost impossible to find them; (5) microscleres, as palmate isochelas; these are all close to 15 microns long, and they are likewise sometimes easily found, while in other colonies it may require long and patient search to locate them.

Type. Lost.

Type locality. East coast of North America, quite conceivably the vicinity of Woods Hole.

Remarks. The species is abundant in the New England waters and ranges as far south as the Carolinas. It is known to range, though rare, as far north as Nova Scotia. It can endure brackish water and intertidal conditions extremely well.

CARMIA Gray
1936, p. 118

5. Carmia fibrexilis (Wilson)

Esperella fibrexilis Wilson, 1891, p. 511 *nomen nudem*, with brief description on the formation of gemmulae; 1894, pp. 279–337, pls. 14–18.
Carmia fibrexilis de Laubenfels, 1936, p. 118 (passim.).

Description. Small sponge, 12–15 cm. in diameter, amorphous, flat, encrusting or forming spheroid masses, often with conical processes, acute and very ragged, sometimes these may be combined to form irregular ridges with sharply cut edges. Color yellowish brown. Consistency mediocre. Pores inconspicuous; they are placed over subdermal cavities. Oscules small, abundant. Ectosome, as a thin dermis, almost devoid of spicules, and easily separated from the underlying tissue by subdermal cavities. Endosome, felted, indistinctly reticulated, with few bundles of spicules, placed without order.

Spicules, consisting of (1) megascleres in the form of tylostyles about 250 microns long (in the peripheral region these spicules form radiating bundles, which divide into brushes, supporting the dermal membrane; (2) microscleres, consisting of abundant anisochelas, 30 microns long, rarely 60 microns long, and besides toxas and sigmas, about 100 microns long.

Type. Probably lost.

Type locality. Woods Hole, growing on wharf piles.

Distribution. So far reported from the Woods Hole waters, where Wilson found it abundant.

Remarks. The species was amazingly enough not collected by Sumner, Osburn and Cole, who merely refer to Wilson's original paper in 1891, overlooking the larger, more detailed paper from 1894. Neither was it included in Zinn's collection, which has been used as the basis for the present account. It is one of the few species which

has been described from abundant material and in great detail, and an exhaustive account has been given of its gemmules and their development. It should be a species well suited for laboratory work, and with its characteristic dermal layer and few, but characteristic spicules, it should be easy to recognize.

The possibility that this species is identical with Lambe's *Esperella modesta*, now *Mycale babici* de Laubenfels (1936, p. 120) is discussed on p 36. As Wilson's name is the older, the result will not affect his name, *fibrexilis*.

Family OPHLITASPONGIIDAE
1936, p. 112

NEOSPERIOPSIS, gen. nov.

This genus is here established to replace *Okadaia* de Laubenfels 1936, p. 120, as this name was preoccupied by Baba in 1930. The diagnosis remains the same. There is a principal reticulate skeleton of monactinal spicules, with distinctive microscleres that resemble sigmas with forked ends; actually these are probably to be regarded as reduced chelas. The closest relationship is to the genus *Esperiopsis*, from which it differs in the shape of the microscleres. The characteristics, other than spiculation, are typical of the family Ophlitaspongiidae, but also resemble sponges of the family Haliclonidae.

The genotype of *Neosperiopsis* is here designated as the following species, *deichmanni*, the holotype to be M.C.Z. No. 6910.

6. Neosperiopsis deichmanni spec. nov.
Fig. 11, 12, and 13

Specimen described. No. 6910, M.C.Z.; holotype.

Description. Massive to lamellate, with digitate projections, resembles in general shape *Haliclona palmata*, while details of its surface resemble those of *H. oculata*. The type measures 10 cm. in height, with four branches, 1–2 cm. in diameter, slightly flattened; the palmate portion is slightly more than 1 cm. thick and 4–5 cm. wide. Color, in alcohol, pale yellowish brown. Consistency, elastic, softly spongy, easily torn. Surface, minutely lumpy, as in *Haliclona*. Pores, visible by the naked eye as minute openings, on small elevations. Oscules, about 2 cm. in diameter, without raised rims; in some places separated by less than 1 cm.'s distance, while other areas, several square

centimeters wide, may lack vents completely. Ectosome, absent; no separable dermis or extensive subdermal cavities. Endosome, finely cavernous, with consistency of the "crumb-of-bread" type.

Skeleton: Spicular tracts are present; the ascending ones measure about 50 microns in diameter, the connecting ones about 30 microns; reticulation not symmetrical or regular; the tracts may or may not contain spongin; if any is present the quantity is small. Spiculation very distinctive. The megascleres are styles, often sharply bent near the rounded end, size 6 by 150 microns. The microscleres are probably reduced chelas, but in shape like sigmas, not contorted, but with each end bifurcated or dichotomously branched; their length (chord) is 21 microns. This type of microsclere characterizes the genus fairly well, as similar spicules are known only in the genera *Strongylacidon*, *Plumocolumella* and *Damoseni*.

Type. M.C.Z. No. 6910.

Type locality. Woods Hole.

Remarks. As already mentioned, the species resembles superficially *Haliclona palmata*, and in the field it has undoubtedly often been passed by, or confused with one of the species of *Haliclona*.

The species that most closely resembles *deichmanni* is *N. quatsinoensis* (Lambe). The latter was described in 1892, p. 69, as *Esperiopsis* from the Pacific Coast of North America (including the other species from the same region, *rigida*, and *vancouveri*, which are straight synonyms of *quatsinoensis*). In general exterior, consistency, surface and interior structure this western form resembles closely the species from Woods Hole, and also the microscleres are extremely similar. The most important difference is that the megascleres are about twice as thick in the Pacific form as they are in *deichmanni*.

Procter in 1933, p. 94, records a species from Maine as *Esperiopsis quatsinoensis* Lambe, and was the first to point out the synonymy of *quatsinoensis* with *vancouveri*, which he refers to, however, as *vancouverensis*, and with Lambe's third Pacific Canadian species, which, however, Procter spells *laxa* instead of *rigida*. Because Procter ignored spicule thickness he was quick to synonymize the Atlantic coast form with that from the Pacific Coast. It may also be true that he had specimens with thick spicules, but it is here considered probable that his Maine specimens had the very thin spicules as found in the Massachusetts species, therefore that Procter's *Neosperiopsis* is also *deichmanni*.

The author, after studying the Woods Hole specimen, obtained a recently collected specimen of Lambe's *quatsinoensis*, U. S. National

Museum No. 2909, collected by K. Holmberg, 25 September, 1947, at Sawak Island, Alaska. Study of this confirms the belief that the Atlantic species is distinct from that of the Pacific Coast.

The specific name is in honor of the eminent marine Zoologist, Elisabeth Deichmann, of Harvard University.

Family HALICHONDRIIDAE
1936, p. 133

Genus HALICHONDRIA Fleming
1936, p. 133

7. Halichondria panicea (Pallas)
Fig. 14 and 15

Spongia panicea Pallas, 1766, p. 388.

Specimen described. No. 6906, M.C.Z.

Description. Fundamentally encrusting but this shape may be profoundly modified by oscular elevations; the sponge is usually less than 1 cm. thick but spreading laterally indefinitely. Color, basically a rather pale orange, often tinged with green by the presence of algae (probably symbiotic, but not indispensible). As in almost all other sponges, the less it is exposed to sunlight, the paler and duller it is in color. Consistency, compressible, "like a piece of fresh bread." Surface, optically smooth, but not level, with shallow undulations, about 1 mm. from crest to crest. Pores microscopic. Oscules, conspicuous, 1–4 mm. in diameter. The tissues of the sponge are elevated around these vents, so that they resemble craters of tall volcanoes. There is a rough correlation between the speed of currents at the sponge's location and the height of these volcanoes. Where the surf dashes back and forth, *panicca* is nearly smooth, but where it grows in comparative calm, the oscular chimneys may be elevated 2 or even 5 cm. In the latter case the width at the base of the tower is about 1 cm. Ectosome, the members of the genus *Halichondria* are distinguished by having a distinct dermis, which can be detached from the underlying tissue.[1] To a large degree this is equivalent to saying that extensive subdermal cavities are present; these are usually less than 1 mm. in diameter, in vertical direction. In the special dermis, which is about 15 microns thick, many spicules are scattered; almost

[1] There are other sponges which have a similar structure to the members of *Halichondria*, but they can easily be differentiated by their lack of a special dermis.

all of them lie parallel to the skin, otherwise they are arranged without order. Endosome, structure like "crumb-of-bread" which inspired the name of the sponge, with cavernous interior with subspherical hollows.

Skeleton: Only oxeas, but of extremely varying sizes. In the Woods Hole material the average size for the complete spicule is about 9 by 300 microns.[1]

Type. Lost.

Type locality. The waters around England and Belgium.

Remarks. The species was first described from Europe, but it is an abundant intertidal species in almost all parts of the world. It endures exceptionally well the vicissitudes of being exposed at low tide.

Family HYMENIACIDONIDAE
1936, p. 136

Genus HYMENIACIDON Bowerbank
1936, p. 137

Hymeniacidon heliophila (Parker)

Stylotella heliophila Parker,[2] 1910, p. 737. Wilson, 1911, p. 13.

Description. The species starts as though it should be an encrusting sponge, but soon sends up digitate processes, 2–4 cm. high and less than 1 cm. in diameter, so numerous that they cover practically the entire surface of the colony. The color is a distinctive bright yellow orange. The consistency is mediocre, easily torn, compressible. The surface is comparatively smooth. The pores are abundant, and microscopic. The oscules, 1–5 mm. in diameter, are usually placed at the tips of the digitate processes. The ectosome consists of a thin fleshy dermis. The endosome is spongy, bread-like, almost cavernous. The skeleton consists of great masses of spicules, sometimes aggregated into plumose columns, with the points directed toward the surface, in other cases scattered and packed without order. They consist of styles, ranging from 4 by 120 to 8 by 350 microns, usually 6 by 200 microns.

[1] Brøndsted published, in 1929, an analysis of the spicule length in *Halichondria panicea.* He found that most spicules varied between 168 and 468 microns, with an average of 340, but the commonest size was 372 microns long. The majority of all the spicules were between 324 and 384 microns. Thus the Woods Hole material has spicules which average slightly less than they do in sponges from European waters.

[2] The name of the author needs an explanation. The species was used by G. H. Parker, for some of his classical studies on the primitive nervous system in the lower invertebrates. He gave a description, accompanied by figures, so detailed that the species can be recognized without difficulty. He quoted Wilson as the author, but Wilson's account was not published until the following year; probably Parker was acquainted with Wilson's manuscript.

Type. Probably not preserved.

Type locality. Beaufort, North Carolina.

Remarks. This species is extremely abundant intertidally at Beaufort, North Carolina. A very similar species occurs in the Mediterranean, and is also locally extremely abundant intertidally or in very shallow water. It appears that both north and south of Carolina the intertidal conditions are such that *heliophila* cannot occur in that environment at all. Perhaps the winters are too cold, or the summers too short north of Carolina. There is less clue to the absence south of Carolina. Yet there is a second type of distribution for this species. It can also penetrate into deeper waters, say 5 to 50 meters depth. Under these conditions it does not flourish, but appears as stunted growths of small area, and only widely scattered instead of several colonies per square foot as are often found near Beaufort. On the other hand, in these somewhat deeper waters, utterly unlike the shallow water range, *heliophila* spreads north and south. It is recorded from the West Indies (north of Cuba) by de Laubenfels 1936, p. 138 and from the Arctic (northwest Greenland) by de Laubenfels 1942, p. 265. Because it occurs thus both north and south of Woods Hole, it is included here among the forms to be expected at that region.

Family CHOANITIDAE
1936, p. 140

Genus CHOANITES Mantell
1936, p. 143

8. Choanites ficus (Pallas)

Alcyonium ficus Pallas, 1766, p. 356.

Suberites compacta Verrill, 1874, p. 744. Sumner, Osburn and Cole, 1911, p. 558.

Specimen examined. U. S. National Museum No. 6352 (Verrill's *S. compacta*).

Description. The shape consists of plates and lobes; the size is often that of a human hand. Color, drab or whitish.[1] Consistency, cartilaginous. Surface smooth to the naked eye and to the touch. The

[1] Verrill mentions that the color is yellow, but it is not impossible that he has based his color note on some other species, for example *Suberites domunculus*, a widespread common form which often is bright yellow. The specimen here established as neotype gave indications of having been dull colored—drab or whitish. The members of the genus *Choanites* are often gray, with or without a pinkish tinge.

pores are microscopic, and the oscules small and inconspicuous, often microscopic. Ectosome not developed as a special dermis, although the spicules are packed rather closer together near the surface than they are elsewhere, and those near the surface are somewhat smaller than those of the interior. The endosome is remarkably compact; the larger canals being barely 150 microus in diameter.

Skeleton: The skeleton consists of megascleres which all are tylostyles, some with rather elongate heads. Their sizes range from 9 by 260, to 8 by 330 microns. The microscleres consist of centrotylote strongyles, 20 microns long.

Type. Lost; U.S.N.M. No. 6352 here designated as neotype of *compacta.*

Type locality. American waters. The neotype came from Vineyard Sound, near Woods Hole, (Albatross).

Remarks. The microscleres are characteristic of *Choanites* and never occur in *Suberites.* The name *compacta* Verrill is invalidated by *Halichondria compacta* Lieberkühn, 1859; this species was transferred to *Suberites* in 1900, by Topsent.

Family SUBERITIDAE
1936, p. 147

Genus SUBERITES Nardo
1936, p. 147

9. Suberites domunculus (Olivi)
Fig. 16, 17, and 18

Alcyonium domunculum Olivi, 1782, p. 241.

Specimen described. No. 6905, M.C.Z.

Description. The sponge forms subspherical masses, often 5 cm. in diameter, sometimes up to 10 cm. Color, typically pale yellow, with or without a pinkish tint added (giving an orange effect) more pigmented on the illuminated side. In preserved condition the color is so pale a gray that it is nearly white. Consistency distinctive, much like that of cork.[1] Surface optically smooth. Pores microscopic, abundant. Oscules, small, and as a rule, inconspicuous. Often the vents are slit-shaped rather than round, even in the living, undisturbed sponge; these slits may measure 0.2 by 2 mm. Ectosome present, with a cortical specialization, approximately 200 microns thick. In this layer the special dermal spicules are densely crowded, perpendicular to the

[1] The generic name *Suberites* refers to the cork-like quality of the sponge.

surface, and pointed outward. Endosome with spicules packed in dense confusion; the soft parts are also dense. There are the usual inhalent and exhalent canals, and flagellate chambers, but these are all small; canals as large as 1 mm. are rare.

Skeleton: Smooth tylostyles which vary greatly in size. Those of the interior of the sponge measure chiefly 9 by 250 microns in the Woods Hole specimen. In other individuals they are often 8 by 320 microns. Special ectosomal spicules, smaller than the endosomal ones, are characteristic of all members of the genus; in *domunculus* these dermal tylostyles range from about 7 by 90 to 8 by 160 microns, usually nearer the smaller size.

Type. Probably lost.

Type locality. Adriatic Sea.

Remarks. The species occurs abundantly, not only in the Mediterranean, but along the shores of Europe and many other regions. When the synonymy of *Suberites* is satisfactorily worked out, *domunculus* will probably be found to be cosmopolitan in its range. It is often found on the shells of mollusks, particularly gastropods, especially where the shell is inhabited by a hermit crab.

SUBERITECHINUS, gen. nov.

Diagnosis. Suberitid, with a skeleton similar to that found in the members of the genus *Suberites*, but with the addition of an ectosomal hispidation of relatively enormous outward-pointing tylostyles.

Type species. Tethea hispida Bowerbank, 1864, p. 304.

Remarks. The spelling *Tethea* is obviously a misspelling for *Tethya*. The species *hispida* is, however, not a *Tethya*. It is close to *Suberites*, as Lambe observed, but the latter has a cortex of outward-pointing small tylostyles, and no other dermal spicules; in *hispida*, ectosomal outward-pointing tylostyles are also present that are much larger than those of the interior of the sponge. Hentschel, 1929, p. 924, recognized that the species could not be referred to *Suberites*, and transferred it to *Polymastia*, but the latter genus is characterized by peculiar, large, thin-walled fistules which are entirely lacking in *hispida*. Hence the necessity exists for establishing a new genus for this species.

SUBERITECHINUS HISPIDUS (Bowerbank)

Tethea hispida Bowerbank, 1864, p. 404. Verrill, 1874, p. 40, Lambe, 1896, p. 194, pl. 2, figs. 5, 5a–d.

Description. Subhemispherical to massive, size of type specimen at least 4 cm. in diameter and less than 2 cm. in height. Color, dull

yellowish. Consistency, compact and firm. Surface, level, extremely hispid, bristling. Pores, microscopic. Oscules usually apically placed, in a shallow depression, diameter about 6 mm. Ectosome, consisting of a cortex, 0.5 mm. thick, packed with small tylostyles as in *Suberites*, and furthermore containing numerous outward-pointing gigantic tylostyles. Endosome, consisting of loose tracts of medium sized tylostyles rising from the base of the sponge to its surface. (Flagellate chambers not examined).

Skeleton: Consists of tylostyles of the following three size-ranges: In the interior, tylostyles 27 by 900 to 1800 microns. In the cortex, smaller tylostyles 2 by 90 to 4 by 180 microns, and larger ones, 20 by 2600 microns.

Type locality. Off Portland, Maine, depth not noted.

Type. Specimen No. 5 of the Whiteaves Collections in the National Museum of Canada, Ottawa, Canada, is here designated as the neotype of *Tethea hispida* Bowerbank, thus also type of the genus *Suberitechinus*.

Distribution. Reported off Sequin Island, Maine, 33 fathoms (Verrill); Portland, Maine (Bowerbank); Casco Bay, Maine, 8–30 fathoms, and St. Lawrence River, near Anticosti, 212 fathoms (Lambe).

Remarks. This species may possibly occur also at or near Woods Hole.

Genus POLYMASTIA Bowerbank
1936, p. 151

10. Polymastia andrica nomen nov.
Fig. 19 and 20

Polymastia mammilaris Lambe, 1896, p. 196, pl. 3, fig. 1.
Nec *Spongia mammilaris* O. F. Müller, 1776.

Description. Subspherical with processes. Type, 4 cm. in diameter. Color, not mentioned, but pale. Consistency, not mentioned, possibly of medium softness. Surface, with smooth fistules, but the main body of the sponge is strongly hispid, with a dense plush of enormous projecting spicules. Pores, typical of the genus, with abundant inhalent openings, but restricted to the surface of the elevated fistules. In *andrica* these are about 15 mm. high. There are 35 such fistules on the type specimen. Oscules, a single oscule in the middle of the fistules (in all Lambe's specimens). In the type the vent is 3.5 mm. broad, on a tube 15 mm. high, 7 mm. wide at its base. Ectosome present as a cortex, but thickness not indicated (in most species of *Polymastia*

this structure is about 1 mm. thick). Endosome, somewhat cavernous. Flagellate chambers, not described.

Skeleton: There are tylostyles of three size ranges, each with its definite location in the sponge. (1) In the main body, 27 by 1500 microns; (2) in the cortex, 13 by 137 to 27 by 750 microns; (3) in the projecting plush, 13–27 by around 5000 microns, often broken.

Type. Specimen No. 8 of the Whiteaves collection in the National Museum of Canada, Ottawa, Canada, is here designated as the holotype of *Polymastia andrica.*

Type locality. Gulf of St. Lawrence.

Remarks. The species is tentatively included in the Woods Hole sponge fauna, on the assumption that some specimens of *Polymastia robusta* Verrill, 1873 (*nec* Bowerbank, 1860, *nec* Lambe, 1896) may be identical with this species. The description here is based on Lambe's "*Polymastia mammilaris*" from Gulf of St. Lawrence. See p. 40. *Polymastia mammillaris* was first described by Müller, 1776, p. 44 as *Spongia m,* transferred to *Polymastia* by Bowerbank, 1862, p. 1104. It has dermal spicules, 3 by 150 microns, endosomal spicules, 8 by 400 microns, only the two categories, and both much smaller than *andrica's.* Sumner, Osburn and Cole list 20 records of Verrill's *robusta* from around Woods Hole. The species *andrica* is set off within its genus by its three distinct spicule types, one of them rendering the surface coarsely hispid.

Family CLIONIDAE
1936, p. 154

Genus CLIONA Grant
1936, p. 154

11. Cliona celata Grant
Fig. 21 and 22

Cliona celata Grant, 1826, p. 79.

Specimen described. No. 6904, M.C.Z.

Description. The young sponge excavates tunnels in calcareous material. These borings measure about 1 mm. in diameter and are of indefinite length, often over 10 cm. long; they meander and branch occasionally and may perhaps accidentally form anastomoses. At the external opening of each branch, there is typically a protruding papille,

about 1 mm. in diameter and 2–3 mm. high. In brackish water this is as far as *Cliona* develops, while in water of full oceanic salinity the sponge continues to grow.[1] There, at the age of 1–2 years, it emerges from its burrows to make masses of fully exposed sponge. These still have the characteristic papillate surface, reminiscent of the above mentioned protruding papilles. This later, massive stage may attain a diameter and also a height of more than 20 cm. Color, bright, light yellow. Consistency, of medium softness. Surface covered by peculiar papilles 1–5 mm. in diameter, and 2.4 mm. high. They are rounded distally, but the base of each is surrounded by well-defined grooves. Some areas of the sponge (perhaps having been covered by foreign material) may be destitute of the papilles, or they may cover the entire upper surface. Pores, microscopic, and presumably confined to the papilles. Oscules, resembling the pores; in large old individuals there may be some obvious vents up to as much as 10 mm. in diameter. Ectosome, fleshy, less than 50 microns thick. Endosome in young individuals with the spicules scattered without order; in older specimens, they become gradually oriented (parallel) into tracts of semi-fibrous nature; these structures branch and may reach a diameter of 2 mm.

Skeleton: Tylostyles abundant, with comparatively little variation in size; they measure about 10 by 300 microns. It must be mentioned that small spirasters (microscleres) may possibly be demonstrated to occur in this species.[2]

Type. Probably lost.

Type locality. Firth of Forth, Scotland.

Remarks. The species is exceedingly abundant on all the coasts of the oceans of the world, as the famous boring sponge or sulphur sponge.

[1] There are indications that dousing with fresh water (as may occur to intertidal sponges when a rain coincides with a low tide) is fatal to the boring sponge. The author has elsewhere (1947, p. 42) expressed the opinion that the principal survival value of the boring habit of *Cliona* is to escape chemical vicissitudes such as brief exposure to lowered salinity.

[2] Some records of the occurrence of these spicules may possibly refer to the less common form, *Cliona lobata*, which conceivably might be expected to occur at Woods Hole. The megascleres of the latter are, however, 4–5 microns thick, contrasted with a thickness of 8–10 microns which obtains for *celata*. See p. 50.

Order CHORISTIDA
1936, p. 166

Family CRANIELLIDAE
1936, p. 173

Genus CRANIELLA Schmidt
1936, p. 175

12. Craniella crania (O. F. Müller)
Fig. 23, 24, and 25

Alcyonium cranium O. F. Müller, 1776, p. 255.

Specimen described. No. 6903, M.C.Z.

Description. The species shows a tendency to be spherical; due to environmental circumstances the final result is always more or less imperfect, though still at least recognizably present. Color, dull yellowish brown. Consistency, firm, cartilaginous. Surface, hispid and felted; thin spicules protrude, sometime so placed as to make a short pile as in plush or velvet. Again these spicules may be so interlaced as to resemble felt, giving a smooth appearance to the surface. Pores, microscopic. Oscules, varying greatly in size, partly due to muscular contractility. In the specimen described here, the oscules are represented, dubiously, by a couple of openings that are less than 1 mm. in diameter. In other specimens the oscules have been observed to measure several mms. in diameter. Ectosome, as a thin cortical layer, less than 20 microns thick, in addition to the above-described felt-like layer of spicules. Endosome with spicules radiating from the center so that they stand almost perpendicular to the surface of the sponge. Each column is packed with spicules running lengthwise, and cemented together by protoplasm, or by colloidal matter with the consistency of protoplasm. Other spicules are strewn between the radiating tracts, and often in some places of these tracts the spicule arrangement is partially broken down into disorder.

The flagellate chamber system is of the rhagon-type, but not well represented by the conventional diagrams of the rhagon pattern, because too much of the sponge's interior is filled by skeleton, while the soft parts are relegated to the interstices.

Skeleton: The megascleres are principally oxeas, about 15 by 1000 to 20 by 2000 microns or even larger. In addition there are a few protriaenes, and still fewer anatriaenes (not illustrated). In these

tetraxon spicules the rhabs are about the size of the oxeas; the three clads of each spicule are only about 50 microns long. The tetraxons occur chiefly in the surface plush, thus are often broken and not recognizable. The microscleres, which are abundantly scattered through the flesh, are sigmoid spirasters, 15 microns long, with a shaft about 2 microns in diameter; they are covered with spines that are much less than 1 micron long.

Type. Probably lost.

Type locality. Denmark.

Remarks. Craniella crania is common in the European waters and has several times been reported from America.

Class CALCISPONGIAE
1936, p. 192

Order SYCONOSA
1936, p. 192

Family SCYPHIDAE
1936, p. 196

Genus SCYPHA Gray
1936, p. 196

13. Scypha lingua (Haeckel)
Fig. 26, 27, and 28

Sycortis lingua Haeckel, 1872, p. 278.

Specimen described. No. 6902, M.C.Z.

Description. Each individual sponge forms a hollow cylinder, somewhat wider at the center than at the ends, and sometimes oval in cross-section rather than perfectly circular. An occasional individual may show branching or budding. Size, usually about 2–3 mm. in diameter and 15–20 mm. in height, up to 5 mm. in diameter, and 400 mm. in height. Color, dingy white, due to reflection of light from the shiny microscopical spicules, with the protoplasm modifying this to a pale dull brown. Consistency, softly fragile. Surface appears smooth, but is microscopically hispid. Pores, frequently closed, present as microscopically small openings, leading into the flagellate chambers (not homologous with the pores found in sponges of the rhagon type).

Oscules apically placed, about half the diameter of the urn-shaped body, often surrounded by a wall 20–30 microns thick and about 1 mm. high, formed chiefly by a palisade of long oxeas, the coronal oxeas. Ectosome, lacking. Endosome, 200–300 microns thick, consisting primarily of flagellate chambers, of the typical sycon-architecture. Each chamber is sack-shaped and about 65 microns in diameter and 200–270 microns long. The large exit opening, which is more than 25 microns in diameter, opens directly into the central hollow of the cylindrical body; this cavity is called the spongocoel or cloaca, and leads to the oscule. Many choanocytes are located on the inner walls of these chambers; in life their flagella can be observed beating inside the chamber. The chambers are situated in respect to the elongate spongocoel much as the bristles of a test-tube cleaner or bottle-brush are placed in respect to the rod which is in the center of such a cleaner. The ramifying space between these chambers corresponds to the inhalent canals of more elaborate sponges, and cross-sections may reveal this space between the chambers in such a way that it seems to resemble inhalent canals. Although homologous with them, this ubiquitous space is not partitioned into distinct canals, and it should therefore not be called by this name.

Skeleton: As usual in sponges, the architecture is outlined by a framework of jelly. In this colloidal mass the amoebocytes wander around, either immersed or crawling on its surface. They are so numerous on the external surface that in fixed stained material they give the misleading impression of being epithelial in nature. In the live sponge they seeth among each other, and do not necessarily touch each other. In the chamber walls lie numerous regular triaxon spicules with rays often 6 microns thick and 100 microns long (various sizes of unfinished spicules occur here, as in all sponges). At the distal end of each chamber there is a bristling tuft or bouquet of oxeas, 10 by 200 to (rarely) 15 by 300 microns. It is on account of these bristling oxeas that the surface is microhispid. The coronal oxeas measure 1–2 mm. in length with a thickness of 20 microns.

Type. U. S. National Museum specimen, catalogue number 22727 is hereby designated as neotype of *Scypha lingua*, the original material being lost.

Type locality. Newfoundland.

Remarks. Woods Hole represents probably the extreme southern range for this species which appears to have its central distribution in the waters around Newfoundland, and has been reported from Fox Basin, near Greenland (de Laubenfels, 1942, p. 267).

The species was originally described as *Sycortis*. The original description was based upon three specimens, sent to Haeckel by a person by the name Taylor. As mentioned elsewhere, it is the species (or possibly one of the sponge species) which supply houses have been selling as *Grantia*, a serious mis-identification.

It is possible that other species of *Scypha* may be discovered to occur in the waters around Woods Hole in addition to *S. lingua*. Most likely to be found are *S. ciliata* and *S. coronata*. The following features should be noted:

The oxeas in the chamber region measure, in *lingua*, 10 by 200 to 15 by 300 microns, in *ciliata*, 6 by 1000 to 11 by 3000 microns, and in *coronata*, 15 by 1000 to 25 by 2000 microns.

The lining of the cloaca or spongocoel contains very few tetraxons in *lingua*, many in *ciliata* and *coronata*.

There may be spicule rays projecting freely into the opening or lumen of the spongocoel. In *lingua* these are uncommon, and when they occur, are straight, about 80 microns long. In *coronata* they are common, and curved, points toward the oscule. In *ciliata* they are also common, and similarly curved, but extremely short—shaped like rose thorns. Such inward-projecting rays have been called "hypogastral" but the spongocoel is not gastric; it is merely an exit passageway. It would be more accurate to call them "hypocloacal."

Order ASCONOSA
1936, p. 198

Family LEUCOSOLENIIDAE
1936, p. 200

Genus LEUCOSOLENIA Bowerbank
1936, p. 200

14. Leucosolenia cancellata Verrill
Fig. 29, 30, and 31

Leucosolenia cancellata Verrill, 1874, pp. 364, 393.
Ascortis clarkii Verrill, 1874, p. 392.

Specimen described. No. 6901, M.C.Z.

Description. A regular ascon-type sponge, consisting of numerous tubes which occasionally branch. The specimen here described represents a colony of more than a hundred such tubes, growing as close together as possible. The tubes are near to 1 mm. in diameter, and

often slightly over 10 mm. high. Color, dingy white. Consistency, soft, fragile. Surface, distinctly hispid. Pores, microscopic, with numerous openings in the walls of the tubes—homologous with the prosopyles in more highly developed sponges. Oscules, representing the open distal ends of the tubes. Ectosome, absent. Endosome, as a thin wall, less than 50 microns thick, crowded with spicules. As usual there is a colloidal ground substance with amoebocytes immersed in it or crawling on both its surfaces, but particularly the outer one. Choanocytes are crowded on the inner surface, often almost touching each other.

Skeleton: The walls contain numerous triaxon spicules, mostly regular and never strongly sagittal, with rays 3 by 100 to 5 by 120 microns. There are a few small oxeas, about 0.5 by 40 microns. These may be microscleres, but they are so scarce that they are here regarded as juvenile spicules. This is important, because the presence or absence of microscleres is regarded as having considerable taxonomic significance. The lack, or rarity of tetraxons is also noteworthy, as they are abundant in many other members of the genus. Furthermore it is usually true that when tetraxons are lacking, oxeas are also absent.

Type. U. S. National Museum specimen, catalogue number 22726 is hereby designated neotype of *Leucosolenia cancellata*, the original material being lost.

Type locality. Casco Bay, Maine.

Remarks. The species appears to be restricted to the North Atlantic coast. It was originally reported from the Woods Hole region under the name of *botrioides*, but the latter is a species which seems to be restricted to the waters around England, and other parts of the northeastern Atlantic.

Verrill gives no measurements for his spicules, but on p. 392 (under *clarkii*) he states that the fusiform spicules (the oxeas) are $\frac{1}{3}$–$\frac{2}{3}$ the length of the triradiate spicules, and also correspondingly more slender, while in the Woods Hole material the dominating oxeas are much larger than the triaxons. In spite of this discrepancy, it is practically certain that the Woods Hole species is identical with the one described by Verrill from Maine.

REVIEW OF THE LITERATURE

a. Literature dealing with the sponges of Woods Hole and adjacent waters.

Sponges from the vicinity of Woods Hole doubtless have been studied as early as the eighteenth century, although it may be difficult

to prove this. Thus Ellis & Solander, 1786, p. 189, described *Spongia prolifera* from "America" but the precise location is unknown. The species is now known as *Microciona prolifera*, and represents one of the most conspicuous sponges in Massachusetts.

Probably the first article devoted to sponges especially of this vicinity is that of Rafinesque (or Rafinesque-Schmaltz), 1818, p. 149, "Description of species of Sponges observed on the shores of Long Island." He names as new the following:

1. *Spongia albescens;* smooth, whitish, branched. Quite unrecognizable.

2. *Spongia cespitosa*; rough, yellow, bushy. Possibly *Haliclona oculata* (Linnaeus).

3. *Spongia cladonia*; smooth, fulvous, branched. Quite unrecognizable.

4. *Spongia ostracina*; stupose, red, branched. Clearly *Microciona prolifera* (Ellis & Solander).

5. *Spongia virgata*; smooth, fulvous, almost branched, slender, knobby. Quite unrecognizable.

In 1848 Desor published, "Description of two new Sponges." These New England sponges are:

1. p. 67. *Spongia urceolata*; probably *Microciona prolifera* (Ellis & Solander).

2. p. 68. *Spongia sulphurea*; definitely a *Cliona*, and probably a synonym of *Cliona celata* Grant, 1826.

Haeckel and other European writers described various American sponges as the years went by; thus Haeckel established (1872, p. 278) *Sycortis lingua* now transferred to *Scypha* (see p. 26). But the next publications dealing extensively with New England sponges were due to Verrill.

Professor A. E. Verrill, of Yale, studied the New England sponges for many years, especially in the 1870's. He undertook to name and describe several sponges, doubtlessly motivated by the urgent need to have designations available for animals that could not appropriately be ignored. Yet it is painfully clear that he did not specialize in the Porifera. His descriptions omit details almost as badly as those made by such early premicroscope writers as Rafinesque. A clue to the predicament that was forced upon Verrill is given in this quotation from his excellent article (1873) on the "Invertebrate Animals of Vineyard Sound,"—on p. 743 he comments: "I have no specimens of this and several of the other species at hand, for most of the sponges were sent elsewhere for comparison with named types, and have not

yet been returned." It is probable that they never were returned. In spite of the inadequacies thus forced upon Verrill, his papers are sufficiently important to warrant a detailed review.

In 1871, Verrill, pp. 357–362, in a report dealing with the Woods Hole fauna, includes a reference (p. 359) to *Spongia sulphurea* Desor, mentioned above.

In 1873, Verrill, pp. 435–441, reports on the results of dredgings in deep water near Portland, Maine. The following sponges are recorded, all on p. 440:

1. *Halichondria ventilabrum.* Discussed as *Phakellia ventilabra* (p. 40).

2. A *Trichostemma.* This name falls in synonymy to the older *Radiella,* and it is likely that Verrill's specimen is *Radiella sol,* which is widespread in the deeper parts of the oceans. This easily recognizable sponge is symmetrical, hemispherical, and lies with the more convex side directed downward; a fringe of enormous spicules (more than 70 mm. long) surround the disk, like the ray-flowers of a daisy or a sunflower. The spicules are tylostyles. The species is to be expected only from deep water.

3. *Hyalonema longissimum* M. Sars. The species has later been better reported under the name *Stylocordyla borealis* Lovenby Lambe, 1896, from the Gulf of St. Lawrence. It likewise belongs in deeper water.

4. A small species of *"Holtenia."* This name is now usually dropped into the synonymy of *Pheronema,* but as the spicules were not studied, it is impossible to guess what the species actually was, so the identification is worthless.

In 1873, pp. 295–778, Verrill published his famous Vineyard report, with a comprehensive ecological survey of the Woods Hole region. In this he lists the sponges which occur in the different types of surroundings. On p. 330 occurs the initiation of an error which has been perpetuated most regrettably. "A small urn-shaped sponge" Verrill opines, is "probably the same" as the *Grantia* of Europe. However, this common sponge from the American waters is a *Scypha,* described as *Sycortis lingua* by Haeckel in 1872 (*Grantia* has a thick, elaborate cortex which is entirely lacking in *Scypha*). As the result of that misidentification, the custom has been established of calling the American *Scypha* by the name of *Grantia* in textbooks, wall charts, commercially prepared microscope slides, and museum specimens.

From the rocky coasts around Woods Hole, Verrill lists:

1. p. 330. *Grantia ciliata.* This has been discussed in the foregoing paragraph.

2. p. 331. *Leucosolenia botryoides* (?). This is now considered identical with *Leucosolenia cancellata* Verrill (see p. 29). Ellis & Solander's *Spongia botryoides*, from the coasts of Great Britain, has so far never been reported with certainty from American waters.

3. p. 331. *Halichondria* sp. This is identical with *Halichondria panicea*.

4. p. 330. *Tedania* sp. This is unrecognizable and almost certainly not a *Tedania*.

5. p. 330. *Reniera* sp. This probably refers to one or more species of the genus *Haliclona*, which are abundant in the Woods Hole region.

From the sandy shores and muddy localities of course no sponges are reported.

From wharves, bridge-piles, and boat-bottoms, Verrill reports the same five species as those he lists from the rocky coast, plus a *Chalina* sp., which undoubtedly represents a growth form of one of the *Haliclonas*. On p. 391 he casually mentions the common red branching sponge; this is certainly *Microciona prolifera*. Also he mentions a slender branching sponge related to *Chalina oculata*. He is doubtless correct in his surmise, but of course the correct designation is *Haliclona oculata*.

From rocky bottom, shallow water, Verrill, p. 409, states that "numerous sponges also occur, but they have not yet been carefully studied." He refers in detail to a sponge which later in the same article he describes as *Chalina arbuscula*. This is probably (but not certainly) *Haliclona palmata*, discussed on p. 10.

For gravelly bottom Verrill gives, p. 420, an excellent account of *Cliona sulphurea* Desor, now *C. celata* Grant.

For sandy bottoms he mentions *Cliona* again (p. 425), and describes a sponge without naming it. It is not at all clear what species is involved.

As might be expected, no sponges are recorded from mud bottom, nor as free swimming, nor as parasites. None are recorded for estuaries, but from brackish water on oyster beds Verrill describes (p. 476) as abundant, the common red sponge (*Microciona*). This ecological location for *Microciona prolifera* is repeated down the coast at least to Beaufort, North Carolina, where the author has found the species in water of less than half the salinity of the open ocean.

For rocky bottom, in deep water, off the coast, Verrill states that sponges are numerous in that environment. He is correct herein, and one might expect up to a hundred species in the Woods Hole region. He mentions (p. 497) that about 12 species were found, "mostly

undetermined." On p. 500 he sums up with *Chalina*, and *Reniera* (*Haliclona*), *Tedania* (unrecognizable) *Cliona*, *Polymastia*, *Leucosolenia* and *Grantia* (*Scypha*).

From sandy and gravelly bottom he stresses the presence of a sponge which he later in the same article (p. 744) describes as *Suberites compacta* (see p. 35).

On pp. 740–745 he gives a catalogue of these species with some additional names. On p. 741 he mentions *Ascortis fragilis* Haeckel, but it is almost certain that none of Verrill's specimens was this European and Arctic species. On p. 742 he mentions *Isodictya*, species undetermined; the species cannot be recognized, and probably it was not an *Isodictya*. On p. 744 he mentions *Halisarca*, likewise species undetermined; this, too, is dubious. Finally he described (p. 744) a new species, *Suberites compacta*. The name is preoccupied and the species is now known as *Choanites ficus* (Pallas) (see p. 19).[1]

In 1874 Verrill published two reports on dredging north of Woods Hole. In the first report (pp. 38–46) he lists, p. 40, without descriptions, the following species:

From off Seguin Island, Maine, 33–46 fathoms: *Tethya hispida*, *Halichondria* spp., *Reniera* sp., and *Grantia ciliata*.

From Casco Bay 8–30 fathoms (p. 44): *Tethya hispida*, *Halichondria pannosa* (undoubtedly a lapsus for *panicea*), *Halichondria* sp., *Reniera* spp., *Cliona* sp., *Isodictya* sp. *I. lobata* (Esper sp.), *I. infundibuliformis*, *Chalina oculata*, *Polymastia robusta* Bowerbank, *P.* no sp., *Grantia ciliata*.

Very little can be said about these names. *Tethya hispida* is discussed on p. 21. *Isodictya lobata* and *I. infundibuliformis* are European species, and belong respectively in *Mycale* and *Tragosia*; there is no indication in Verrill's paper to bear out his identifications, which almost certainly are incorrect, so both species should be omitted from the list of New England sponges.

In the second report, pp. 496–505, he lists, on p. 505, 23 sponges from Cashe's Ledge and Jeffrey's Ledge: *Hyalonema longissimum*, *Dorvillia echinata* n.sp., *Tethya hispida* Bowerbank, *Polymastia robusta* (?), *P. mammilaris* (?), *Trichostemma* sp., *Suberites* (?), *Cliona* sp., *Reniera* spp., *Halichondria panicea*, *H.* sp., *Isodictya infundibuliformis*, *I.* sp., *Grantia ciliata* (*Sycandra* Haeckel), and *G. artica*. Besides he mentions several other sponges not named.

[1] There might be some difficulty in assigning the author for this species. The description appears in a catalogue, pp. 537–778, compiled by Verrill, Smith and Harger, but it is explained in the text who is responsible for the different sections, and Verrill gives his name to the sponges. As *compacta* is a synonym, it is not of great importance. It is mentioned here because Sumner, Osburn and Cole often write "Verrill and Harger," which is not warranted.

Of these species he describes (p. 500) *Dorvillia echinata*, but adds, in a footnote (p. 501), that it possibly is identical with *Thenea muricata* Gray, which Whiteaves had reported with some doubt, from the Gulf of St. Lawrence (see below, p. 41).

In 1874, pp. 340–395, Verrill reports on the exploration of Casco Bay, Maine. Much of the article is an account, in slightly different words, of the material discussed on p. 440 in the shorter article of 1873. He adds, however, three new species:

1. p. 392. *Ascortis clarkii*; abundant in shallow water in Quahog Bay; this seems to be identical with the species that he describes on the following page from Casco Bay, 10–64 fathoms.

2. *Leucosolenia cancellata* (p. 393, name mentioned on p. 360). This name should be retained and it is also undoubtedly the one which should be used for the species known from the Woods Hole region (see p. 28).

3. The third species is *Leucandra cyathus*, p. 392 (briefly mentioned without name on p. 360). It was transferred to the genus *Vosmaeropsis* by Dendy and Row in 1913, p. 756, although neither the two authors nor anybody else could be quite sure of what Verrill had before him. The architecture is stated to be a generalized rhagon-type, and the spicules include all the four types which are common in the Calcispongia in general: monaxons, regular triaxons, sagittal triaxons (T-shaped) and tetraxons, but Verrill gives no spicule sizes. The shape of the sponge is a deep goblet or bell, and this should serve to identify the species, but the generic allocation is quite dubious. It is to be hoped that additional specimens may some day be found in New England, possessing the specifications here given; by further study it should be easy to designate the correct genus. *Vosmaeropsis* is based upon the arrangement of the sagittal triaxons, and the evidence that they are pseudosagittal rather than typically sagittal.

In 1878 Verrill reports, on p. 406, a *Cliona* burrowing in marble; the marble was sunk by a shipwreck, hence the date for the beginning of the boring is known (1871); the galleries tunnelled into the marble during seven years (or less) have penetrated 5 cm. deep or even more.

In 1879 Verrill reports, on pp. 204–205, a new species from off Nova Scotia, 180 fathoms, 43° 17′W., *Cladorhiza grandis*. In 1905 Lundbeck referred this species to the genus *Chondrocladia*, but appropriately commented upon the fact that the species is not well known. Thus Verrill says nothing about the spicules; the description is solely based on the external shape, and it is not accompanied by any figures.

Hyatt described in 1878, p. 163, a new species from New England

(Buzzard's Bay), *Tetilla gravata.* The species is clearly a *Craniella* and almost certainly *Craniella crania,* which is discussed in detail on p. 25.

Probably the most significant publication upon the sponges of Woods Hole that has yet appeared is the one published (1913) in the Bulletin of the Bureau of Fisheries for 1911, "A Biological Survey of the Waters of Woods Hole and Vicinity," by F. B. Sumner, R. C. Osburn and L. J. Cole. They record the following species:

1. p. 556. *Ascortis fragilis* Haeckel. The genus *Ascortis* has long since been regarded as a synonym of *Leucosolenia*; the material belongs probably to *L. cancellata.*

2. p. 556. *Leucosolenia* sp.; "found at several stations." It is not clear how the authors differentiate between these two species. There is one species of *Leucosolenia* known from Woods Hole which in the present paper is considered *L. cancellata* Verrill.

3. p. 556. *Grantia ciliata* Verrill and Smidt. This is obviously the common *Scypha lingua.* The use of the name *Grantia* goes back to Verrill's above-mentioned error. Why the authors attribute *ciliata* as they do is not clear; *ciliata* was established by Fabricius in 1780 for a European sponge. (Throughout the article the reference "Verrill and Smith" occurs repeatedly, clearly indicating Verrill's publication of 1873, already reviewed, in which the species are first established by Verrill, and then summarized by Verrill, Smith and Harger. It would appear that the credit should go either to Verrill alone, which probably is correct, or to Verrill, Smith and Harger).

4. p. 557. *Cliona celata* Grant. Already discussed. Sumner and others make such comments as "abundant, sometimes fills the dredge," and "4 to 35 meters." It is also found intertidally.

5. p. 557. *Polymastia robusta* Bowerbank—"identified with doubt by Verrill and Smith."

6. p. 558. *Suberites compacta* Verrill. This species has already been mentioned in connection with Verrill's 1873 publication, p. 740. The species is here considered synonymous with *Choanites ficus* (Pallas) and described in detail on p. 19.

7. p. 558. *Tethya gravida* Hyatt. In the general description, 1877, p. 34, Hyatt says "about 20 records." It is at present impossible to make out what sponge the various authors have been dealing with. A cosmopolitan sponge, *Tethya aurantia* (Pallas), should be expected at or near Woods Hole. It is a decidedly symmetrical, spherical or ovoid sponge, often reaching the size of a hen's egg, and covered all over with wart-like projections. The color of the sponge is a beautiful golden yellow, except when it is covered by a layer of green algae.

The consistency is firm, cartilaginous. The pores and oscules are small and inconspicuous. The cortex is well developed, fibrous and more than 1 mm. thick. The inner part of the sponge contains radiating fascicular bundles of long spicules, 2–5 mm. long. All the columns arise from a single central point and are approximately perpendicular to the surface, each ends at one of the surface warts. The spicules consist of megascleres in the form of styles with shafts that are largest in the middle instead of at one end, and microscleres consisting of euasters and spherasters, the latter large and often localized near the surface.

8. p. 558. *Halichondria panicea* (Pallas). The authors state correctly that this is one of the most abundant species of the Woods Hole region, adding that it forms irregular pale yellow masses on stems and fronds of algae.

9. p. 558. *Halchondria caduca* Bowerbank. The specimens were identified by Dr. Cushman; they came from various localities in Vineyard Sound and Buzzards Bay. Bowerbank's description reads like a good account of *Halichondria panicea,* and Topsent, 1894, p. 19 has in a careful analysis proved that the two forms are conspecific. It is not clear how the specimens of *caduca* from Massachusetts were differentiated by Dr. Cushman and later by the three authors. Besides this species the authors mention other unidentified *Halichondrias* and *Renieras.*

10. p. 558. *Chalina arbuscula* Verrill. As already noted this is probably, but not certainly, *Haliclona palmata,* discussed on p. 10.

11. p. 558. *Chalina oculata* (Pallas). This is *Haliclona oculata* (Linnaeus). See p. 9.

The authors add further *Chalina* sp. indet., and significantly add: "Dr. Cushman believes that a confusion exists in Verrill's descriptions of the two foregoing species. It is therefore necessary to enter as undetermined all the *Chalinas* taken during the Survey dredgings," also "dried specimens often of large size are to be found in abundance upon the beach at Cuttyhunk Island and elsewhere."

12. p. 559. *Microciona prolifera* (Ellis & Solander). The authors comment that large colonies thrive at the mouth of Wareham River, and in the upper half of Buzzards Bay, and that the species is also widely scattered elsewhere.

13. p. 559. *Esperella modesta* Lambe. A specimen thus identified by Dr. Cushman was taken in Buzzards Bay, near Cuttyhunk, at Fish Hawk Station 7671. This name has been discussed on p. 39 (changed to *Mycale babici* by de Laubenfels 1936). It seems clear that species

related to *Mycale* do occur in New England. The identification of Dr. Cushman's specimen as *babici* is by no means certain on the basis of published accounts. Perhaps it should be referred to the following species.

14. p. 559. *Esperella fibrexilis* Wilson. The authors have only Wilson's first use of the name in 1891, p. 511, where he says that it is abundant near Woods Hole, but gives no description, so it represents a *nomen nudem.* However, in 1894, p. 279, he described the species in great detail, and in 1936, p. 118, de Laubenfels transferred it to the genus *Carmia.* It is here described as *Carmia fibrexilis* on p. 14.

15. *Desmacidon palmata* (Johnston). It appears that Johnston never described a species as *palmata.* He merely referred to *Spongia palmata* of Ellis & Solander, which is a *Haliclona.* As *H. palmata* never has been referred to *Desmacidon,* and no *D. palmata* ever has been described, the present author holds that unwittingly a new species has been described which must be recorded as *Desmacidon palmata* Sumner, Osburn and Cole, 1913, p. 556. Type locality, Crab Ledge, at extreme western end of Vineyard Sound; taken at six stations, in one case the depth was noted as 20–38 meters. The specimens are large and in life dark red in color. This is of course insufficient for recognizing the species, but if the specimens were available, it is by no means certain that they would prove to belong to *Desmacidon.*

The authors comment further (p. 559) on "*?Isodictya* sp." (Verrill, 1873, p. 742) as being perhaps the above-mentioned *Desmacidon.*

In addition the authors list (p. 559) some sponges which Dr. Cushman referred to the genus *Myxilla,* dredged along the western shore of Buzzards Bay at 4 fathoms depth. Not only is the species uncertain, so also is the generic allocation.

b. Review of sponge papers dealing with the region north of Woods Hole.

Whiteaves published, in 1871, 1872 and 1874, three articles dealing with sponges and other marine animals, from the Gulf of St. Lawrence. However, these papers are based chiefly on dredging operations, and give little information about the sponges which have been named in these collections; hence they are not reviewed in detail here. Lambe's papers describe them better.

In 1896 Lambe described a number of sponges from eastern Canada, including those named by Whiteaves. The paper is reviewed here in its entirety, as several sponges belong to both the Woods Hole and the Gulf of St. Lawrence regions, while others may be expected also to be found in the Woods Hole region. Thirty species are considered:

1. p. 182. *Halichondria panicea* Johnson. This sponge is already known to be common in Woods Hole; it is not only found in the Canadian waters, but is practically cosmopolitan.

2. p. 182. *Eumastia sitiens* Schmidt. This species should definitely be expected near Woods Hole. *Eumastia* was reduced in synonymy to *Pellina* by de Laubenfels, 1936, p. 68. The sponge is a mass of thin-walled fistules. The spicules are large oxeas, about 15 by 700 microns.

3. p. 183. *Reniera rufescens* Lambe. This is probably *Haliclona permollis* (Bowerbank).

4. p. 183. *Reniera mollis* Lambe. This requires the same comments as *rufescens*. The members of the genus *Haliclona* are rather generalized sponges, with isodictyal reticulation of small oxeas.

5. p. 184. *Chalina oculata* (Pallas). This is correctly named *Haliclona oculata*. It is known long since as an abundant sponge in the Woods Hole region.

6. p. 184. *Gellius arcoferus* Vosmaer. The species was transferred to the genus *Orina* by de Laubenfels 1936, p. 69. It is an undistinguished sponge with oxeas 19 by 450 microns, sigmas 16 microns long, and toxas 65–175 microns long. It may be expected in deep water near Woods Hole.

7. p. 185. *Gellius flagellifer* Ridley and Dendy. The species has been transferred to *Sigmadocia* by de Laubenfels, 1936, p. 69. It is undistinguished looking sponge, with oxeas 18 by 420 microns long and as microscleres contorted strands 60 to 520 microns long. These are possibly deformed toxas but are more commonly considered deformed sigmas. The species is cosmopolitan. As it has been reported north of Woods Hole by Lambe, and south of Woods Hole by Vosmaer (in the report of the "William Barents" expedition, 1885), it should be expected also at Woods Hole.

8. p. 186. *Desmacella peachii* var. *groenlandica* Fristedt. Burton, 1930, p. 522, has shown that this species is synonymous with *Biemna varianta* (Bowerbank), a species which is abundant in the whole north Atlantic region, European as well as American. It is a sponge of undistinguished exterior, with styles of great size variation, from very small to 30 by 1800 microns. The microscleres likewise vary greatly in size within the same individual; sigmas 8–32 microns, raphides 40–280 microns, and occasionally comma-shaped microscleres, 8–20 microns long.

9. p. 186. *Esperella lingua* Bowerbank. This species was made the type of *Mycale* by Gray, 1867, p. 533. Externally it is characterized by its surface which is imperforate except for the presence of peculiar

grooves and cracks in which the pores are hidden. The oscules also pierce the surface and are quite conspicuous. The spicules are tylostyles, 13 by 530 to 1150 microns. For microscleres there are palmate anisochelas of several sizes (see fig. 1A), also sigmas and raphides. This species is common on both sides of the North Atlantic, and might be likewise expected to occur at Woods Hole (see fig. 1A, below).

10. p. 188. *Esperella modesta* Lambe. This has also been transferred to *Mycale*; it was renamed *M. babici* by de Laubenfels, 1936, p. 120, as the name *modesta* was invalidated by *Esperia modesta* Schmidt, 1862, p. 57. The species was based on a single specimen and is not well known. A species which is fairly well known in the waters around Woods Hole has been referred to Lambe's species (in 1913), but it is not unlikely that the species ultimately will prove to be identical with another Woods Hole species originally described by Wilson (1894). See p. 14.

11. p. 188. *Cladorhiza abyssicola* Sars. This is a bush-shaped sponge with roots. The spicules are long, fusiform styles, sigmas, and peculiar unguiferate anisochelas. It is characteristic of very deep water, chiefly Arctic, and is not likely to be found in the vicinity of Woods Hole.

12. p. 189. *Cladorhiza nordenskioldii* Fristed. Brondsted has shown, in 1914, p. 492, that it is synonymous with *Asbestopluma pennata* (Schmidt). It is an elaborately bush-shaped form, with roots. Smooth styles are present in plumose columns; in the dermis are found acanthostyles, palmate anisochelas, and sigmas. It is characteristic of the very deep water, chiefly Arctic, and is not likely to be taken near Woods Hole.

13. p. 190. *Desmacella palmata* Johnston. Bowerbank made this species the type of the genus *Isodictya*, 1858, p. 197, but the species must be credited to Lamarck, *Spongia palmata*, 1814, p. 452. The species is ramose, externally similar to a well developed *Haliclona oculata*. The spicules are of two types: oxeas, 8 by 200 microns, and distinctive palmate isochelas, 28 microns long (see fig. 1B). The species is moderately common on both sides of the North Atlantic, and is definitely to be expected near Woods Hole.

14. p. 191. *Iophon chelifer* Ridley and Dendy. This is probably *Iophon nigricans*, which was first described as *Halichondria nigricans* by Bowerbank, 1863, p. 767, and made the type of *Iophon* by Gray, 1867, p. 534; it is a common North Atlantic species.

In January, 1948 Dr. Elisabeth Deichmann sent the author *Iophon* material collected from the Portsmouth area of the Gulf of Maine, 16 nautical miles due east of Hampton Beach, 243 fathoms deep. This

material proves to be *Iophon nigricans*. Undoubted *Iophon chelifer* records are confined to South Africa and the Antarctic; the two species are closely related, *nigricans* being the prior name. Ridley and Dendy's species (1886, p. 348) has much smaller anisochelas and differently shaped bipocilli than those of *nigricans*. *Iophon* is definitely to be expected in the Woods Hole vicinity (see fig. 1C, below).

15. p. 191. *Myxilla incrustans* (Johnston). This was described as *Halichondria i.*, 1842, p. 122. It is an undistinguished appearing sponge, with a principal spiculation of acanthostyles 8 by 190 to 15 by 350 microns. There are dermal tylotes 6 by 170 to 10 by 260 microns, with microspined ends. The microscleres include sigmas and anchorate isochelas (illustrated by fig. 1D). The species occurs on both sides of the North Atlantic and might be expected at or near Woods Hole (see fig. 1D, below).

16. p. 192. *Clathria delicata* Lambe. This species which Lambe described as new, appears clearly to be the widespread, well-known *Microciona prolifera*, and is herewith relegated to the synonymy of that species.

17. p. 192. *Phakellia ventilabrum* (Johnston). This should be spelled *ventilabra*, and credited to Linnaeus, 1767, p. 1296 (*Spongia ventilabra*). The sponge is cup-shaped, often 12 cm. high and wide; some individuals are assymmetrical, approaching the fan-shape. The skeleton fibers contain a core of curved, or even several times curved strongyles, often measuring 20 by 1500 microns. These fibers bristle with outward-pointing styles measuring 13 by 440 microns. This species is common in both the eastern and western part of the North and South Atlantic. Verrill, 1873, p. 440, has recorded this species from the New England waters, so it is very likely that it will be found at or near Woods Hole.

18. p. 193. *Suberites ficus* (Johnston). The name is now changed to *Choanites ficus* (Pallas). The species is listed among the Woods Hole sponges. See p. 19.

19. p. 194. *Suberites hispidus* (Bowerbank). The species has been transferred to a new genus *Suberitechinus*.

20. p. 195. *Polymastia robusta* Bowerbank. Verrill (1873, p. 744) has, with some doubt, identified a Woods Hole sponge as *P. robusta*.

21. p. 196. *Polymastia mammilaris* (Müller). Lambe's *mammilaris* is here considered a new species, unique among the other members of the genus in having a strongly hispid body. It is described above as *Polymastia andrica*, n. n. on p. 22.

22. p. 197. *Trichostemma hemisphericum* M. Sars. Burton, 1930,

p. 510, has shown this species to be conspecific with *Radiella sol*, Schmidt, 1870, p. 48. It has been recorded from the West Indies (de Laubenfels, 1936, p. 150) as well as north thereof, but only from very deep water. Verrill reports it from off New England, 1873, p. 440, as a *Trichostemma*, and it might be expected in dredgings from near Woods Hole.

23. p. 198. *Tentorium semisuberites* Schmidt. This is a symmetrical, mushroom-shaped sponge with a few small crater-like oscules on the upper surface. The spicules are only tylostyles, 13 by 270 and 20 by 2400 microns. Verrill reports it from New England (1874, p. 500). It occurs exclusively in very deep water, but it is conceivable that it might occur near Woods Hole.

24. p. 200. *Stylocordyla borealis* Loven. This is a symmetrically built sponge with a spherical body at the summit of a very long slender stalk. Its spicules consist solely of fusiform strongyles. Verrill reports it from the New England waters (1873, p. 440 and 1874, p. 505) as *Hyalonema longissimus* M. Sars, so it might possibly be taken near Woods Hole, but only in very deep water.

25. *Cliona celata* Grant. This is a well known and widespread species which is abundant in the Woods Hole region.

26. p. 202. *Thenea muricata* Bowerbank. This is a symmetrically developed sponge, round, with an equatorial groove between spicular fringes, with rooting tufts of spicules. The spiculation includes oxeas, plagiotriaenes, anatriaenes, and protriaenes as megascleres, with oxyasters and spirasters for microscleres. It has been described from the New England waters as *Dorvillia echinata* by Verrill, 1874, p. 510, and it may possibly be found in very deep water near Woods Hole. (In a footnote, he himself suggests it might be *Thenea muricata* Gray.)

27. p. 203. *Leucosolenia cancellata* Verrill. Lambe's material, from the Gulf of St. Lawrence, differs in only minor respects from the Woods Hole material, which probably represents the southernmost range. Thus his triradiate and quadriradiate spicules have rays which measure about 9 by 130 microns. The type locality was Casco Bay, Maine. See p. 28.

28. p. 204. *Sycon protectum* Lambe. This should be known as *Scypha protecta*, as *Sycon* fell in the synonymy of *Scypha*. Only a few specimens are known, all from the Gulf of St. Lawrence, but they are very distinctive. Dermal triradiates perch around the pores, all three rays placed, or even bent, so as to shield the opening—a quite unique condition; the rays measure 8 by 110 microns. Generalized hypogastral quadriradiates are present, and some oxeas 20 by 1000 microns. There

is a coronal fringe around the oscule, consisting of oxeas 4 by 4000 microns long. It does not seem likely that this species should reach Woods Hole.

29. p. 205. *Sycon asperum* Lambe. This is likewise a *Scypha* and the name was changed to *lambei* by Dendy and Row, 1913, p. 746, as the name *asperum* was twice preoccupied, first by Schmidt, 1862, p. 15, later by Gibson, 1886, p. 364. The species was based on a single specimen and it is here relegated to the synonymy of *Scypha coronata* (Ellis & Solander), an abundant European species. See p. 28, under *Scypha lingua*, where a comparison is given of three species of *Scypha* (*lingua*, *coronata* and *ciliata*).

30. p. 206. *Grantia canadensis* Lambe. The three specimens from the Gulf of St. Lawrence which Lambe examined seem to represent the only authentic occurrence of *Grantia* in North American waters. As stated elsewhere, the genus is common in European waters. The genus differs from *Scypha* in that it has a cortical layer over the entire outside, whereas the flagellate chambers of *Scypha* are naked. *Grantia canadensis* exhibits a highly developed sycon architecture. The principal spicules are triradiate, with rays 200 to 300 microns long (diameter not given). The gastral quadriradiates are of about the same dimensions. In the chamber layer are found oxeas 13 by 700 microns long; around the oscule are found coronal oxeas which are 5 by 1800 microns long. The species has never been reported from the Woods Hole region, but one should be on the watch for it, as it easily may be mistaken for the more plentiful and outwardly similar members of the genus *Scypha*.

In 1900, Transactions of the Royal Society of Canada, Lambe published a second article on the sponges of Canada, but, as he says, this paper consists of identifications or descriptions of sponges found farther to the north, off the coast of Labrador, in Davis Strait and Baffin Bay. In terms of likelihood, it is less to be expected that the forms described in that paper should occur near Woods Hole, unless they are some already discussed in the paper of 1896. It has therefore been deemed unnecessary to review this later paper.

In 1933 William Procter published a "Biological Survey of the Mount Desert Region." This locality is on the coast of Maine, latitude 44° 20′ north, longitude 68° 20′ west. Of this report, pages 78 to 115 are devoted to Porifera, with twenty-six species recorded. The list is confined to so-called Monaxonida, omitting any sponges that belong in the orders Choristida, Carnosa and Keratosa. It is not clear whether Procter would have regarded Epipolasida as "monaxon" or not.

Furthermore, any Calcispongiae of the region are, of course, omitted. The article, most regrettably, gives no illustrations of spicules or sponges. Spicule diameters are consistently omitted, and almost no information is given as to the ectosomal structures, which nowadays are regarded as possessing especial significance. Thus it happens that for some of these Maine sponges it is impossible to tell what species, or even what genus is really represented. On the other hand, it seems clear that an exceptionally thorough study of the region has been made, with few or no species overlooked.

The Mount Desert Island sponge fauna, as reported by Procter, may be summarized as follows:

1. p. 86. *Halichondria panicea* (Pallas). Correctly identified. Abundant in Maine.

2. p. 87. *Halichondria genitrix*. Procter has two specimens which he thus identifies. His description does not guarantee the correctness of the identification, but neither does it contraindicate correctness. The species *genetrix* was described as *Amorphina* by Schmidt, 1870, p. 41, and transferred, correctly, to the genus *Topsentia* by Topsent, 1920, p. 29. This is not close to *Halichondria*, but has a peculiar skeleton of very large oxeas, interspersed with very small ones.

3. p. 87. *Halichondria fibrosa* (Fristedt). Procter comments that his specimen thus identified is much like the preceding. His description reads even more like *Topsentia genitrix* than the preceding does, and it is here suggested that it should also be so identified.

4. p. 88. *Eumastia sitiens* Schmidt. This abundant Maine species appears to be correctly identified as to species. As to genus, however, de Laubenfels, 1936, p. 68, reduced *Eumastia* in synonymy to *Pellina*. This species, *Pellina sitiens*, consists of extremely thin-walled tubes. The skeleton is made of oxeas which are fastened together at their ends by a small amount of spongin in the isodictyal arrangement.

5. p. 88. *Reniera cinerea* (Grant). Procter does not show how his one specimen so identified differs from the following. It is here suggested that it is conspecific with the following.

6. p. 89. *Reniera heterofibrosa* Lundbeck. The abundant Maine species thus identified, on the basis of Procter's description and extreme likelihood as well, is here instead referred to the very abundant, widespread species *Haliclona permollis* (Bowerbank), discussed elsewhere in this article, page 11.

7. p. 90. *Reniera ventilabrum* Fristedt. "Several specimens." The species identification is very probably correct, but Burton, 1930, p. 516, transferred *ventilabrum* to the genus *Cladocroce*. Procter synonymizes

Lundbeck's *Renieras folium, hyalina* and *parenchyma* with *ventilabrum*. It seems clear that Procter is quite correct in this action, therefore it is here further confirmed that these three should be dropped to *Cladocroce ventilabrum*. This species is leaf or vase shaped, with plumose fibers in a ground mass that is an isodictyal reticulation of spicules. The latter are exclusively oxeas.

8. p. 93. *Reniera urceolus* (Rathke and Vahl). Procter mentions "2 beautiful specimens." It would seem from his description that they were either *Haliclona* or *Callyspongias*, but they may belong in yet some other genus. More information is needed.

9. p. 93. *Chalina oculata* (Pallas). This is the common sponge *Haliclona oculata*, discussed in this article on page 9. It appears to be only moderately abundant in Maine.

10. p. 94. *Esperiopsis quatsinoensis* Lambe. Procter records this from two stations. It is clearly a *Neosperiopsis*, almost certainly that which is described as *N. deichmanni* elsewhere in this article (p. 15). A principal difference between *deichmanni* of Woods Hole, and *quatsinoensis*, which is a species of the Pacific Coast of North America, is that *deichmanni* has much thinner spicules. It is therefore regrettable that Procter does not give spicule diameters. The opinion is here nevertheless expressed that the Maine specimens were probably *Neosperiopsis deichmanni*.

11. p. 96. *Esperiopsis* sp. Almost certainly not an *Esperiopsis*. Procter makes frequent allusion to "the peculiar *Homoeodictya* chelae" but gives no figures to show what he has in mind. The spicule type that he refers to, according to him occurs in species that correctly belong in the genera *Neosperiopsis* and *Isodictya*, but these genera have microscleres that differ emphatically. Does he mean *Neosperiopsis* chelas, or does he mean *Isodictya* chelas?

12. p. 97. *Mycale lingua* (Bowerbank). On the basis of Procter's description, his few specimens of this sort are correctly identified. Further notes are given in connection with the following species.

13. *Mycale ovulum* (Schmidt). The few specimens thus designated appear to be correctly identified as to species, but *ovulum* was transferred into the genus *Mycalecarmia* by de Laubenfels, 1936, p. 120. On page 14 of this article there is a description of *Carmia fibrexilis*; three closely related genera may be compared as follows:

Mycalecarmia has anisochelas as microscleres.

Mycale has anisochelas and sigmas.

Carmia has anisochelas, sigmas and toxas.

All three have a principal skeleton of styles in fibers, usually rather

plumose fibers, and notably cavernous structure. They differ chiefly in microsclere content. It is conceivable that they are really congeneric, but it is here suggested that it is well to be cautious about such a conclusion; if the three sorts are discussed under separate headings, one can know which of the three types is involved.

14. p. 99. *Myxilla incrustans* (Johnston). This species is common in Europe and the Arctic, and is recorded by Lambe from Eastern Canada. Although Procter gives inadequate data, the assumption is here made that his identification is correct. The species is uncommon in Maine, but might occur, also uncommonly, as far south as Woods Hole. This is an inconspicuous encrusting sponge, that has somewhat the "bath sponge" look to the naked eye. The ectosomal skeleton consists of smooth tylote spicules. The endosomal skeleton is made of spiny styles arranged—many on a side—about triangular or polygonal spaces. The microscleres comprise sigmas and isochelas. The latter are of the sort termed anchorate in the genus *Myxilla*, but are instead arcuate in the otherwise similar genus *Lissodendoryx*. Procter gives no data as to whether his specimens had arcuate or anchorate chelas. *Lissodendoryx* is abundant to the south of Woods Hole, therefore further comparison is in order. Nearly all specimens of *Lissodendoryx* (say 99 out of 100) have a distinctive, pungent, "sulfureous" odor. This is not mentioned in the literature for *Myxilla* specimens, but neither is its absence recorded. This may or may not be a useful point of comparison, but probably is. The principal spicules of *Myxilla* are always very spiny. Most of them in *Lissodendoryx* are usually quite smooth, but some or all may be more or less spiny. This trait may nevertheless have considerable value in separating the two genera—a specimen with all smooth endosomal spicules would probably not be a *Myxilla* (see fig. 1D, below).

15. p. 100. *Myxilla fimbriata* (Bowerbank). The few specimens so identified by Procter may also be *Myxilla incrustans*, or may be some *Lissodendoryx*. The species *fimbriata* has a peculiar anchorate isochela, and Procter's description does not indicate that his specimens were so provided. This is genus and species incertae sedis.

16. p. 101. *Homocodictya palmata* (Johnston). Only one small specimen was discovered in Maine, but Lambe found this more common a little further north. The correct genus is *Isodictya*; Ehlers, 1870, p. 17 tried to change the earlier name, of which he disapproved, but of course his later name falls in synonymy (see fig. 1C, below).

17. p. 101. *Tedania suctoria* Schmidt. The few specimens so identified seem to be quite correctly placed. This species has a dis-

tinctive warty upper surface, but not the spherical form of the also warty genus *Tethya*. The ectosomal megascleres are smooth tylotes 3 by 250 to 6 by 500 microns, the endosomal megascleres are smooth styles about 7 by 400 microns, chiefly in confusion. The microscleres are rough-surfaced, very thin rhaphides, 50 to 500 microns long. This species should be expected to occur at Woods Hole.

18. p. 102. *Stylotella simplissima* (Bowerbank). The species *simplissima* was described as *Raphiodesma s.* by Bowerbank, 1874, p. 323, and correctly transferred to the genus *Stylinos* by Topsent, 1892, p. 136. Procter's solitary specimen is a crust, where *simplissima* tends to be fan-shaped. The Maine specimen is probably *Hymeniacidon heliophila*, discussed on page 18 of this article. This latter species flourishes amazingly in the intertidal regions about Carolina, but is entirely absent from colder intertidal areas. In deeper water it does not thrive, but does occur, even up to the Arctic.

19. p. 104. *Iophon chelifer* Ridley and Dendy. A sponge that is clearly an *Iophon* is described by Procter as abundant in that part of Maine. In January 1948, Dr. E. Deichmann sent to the author *Iophon* material from the Gulf of Maine, 16 nautical miles due east of Hampton Beach, only some 30 miles north of Procter's stations. This material proves to be the species *Iophon nigricans*, a common sponge in the whole North Atlantic region, first described as *Halichondria n.* by Bowerbank, 1865, p. 767. Sponges that are certainly *Iophon chelifer* are reported only from South Africa, the south Indian Ocean and the Antarctic. They differ from the earlier species *nigricans* only in minor points, especially shape of the bipocilli. Procter does not figure his spicules, but it seems quite evident that he had *nigricans* rather than *chelifer* (see fig. 1C, below).

20. p. 104. *Microciona prolifera* Verrill. Aside from crediting the wrong author, this is obviously a correct identification. This species, so abundant at Woods Hole, and for several hundred miles to the south thereof, was represented by only one small specimen in the Maine collections.

21. p. 106. *Suberites hispidus* (Bowerbank). This species was fairly common in the Maine collections. Elsewhere (p. 21) in this article it is redescribed as *Suberitechinus hispidus*.

22. p. 108. *Suberites montalbidus* Carter. A few specimens found in Maine, and thus identified, are so described as to make it evident that they are really *Choanites ficus*, discussed elsewhere in this article. It is very likely, as Topsent opined in 1900, that Carter's Arctic species (*montalbidus*) may also belong in the species *ficus*.

23. p. 109. *Suberites concinnus* Lambe. Procter thus designates six specimens, using the words "with some doubts." It is impossible to tell, from his description, to what genus or genera these six sponges belonged. It might prove to be equally impossible to identify them if the specimens were available; the opinion is here expressed that they may be abnormal specimens of some other local species.

24. p. 110. *Polymastia robusta* Bowerbank. The few specimens thus designated by Procter are probably correctly identified, although all the *Polymastia robustas* of various authors as found on the west shore of the Atlantic differ slightly in spicule size from those of the east Atlantic.

25. p. 112. *Polymastia* sp.? Procter describes six specimens from his locality without finding a species for them. He had good reason to be puzzled. They clearly belong to that which is in the present article described as *Polymastia andrica* new species.

26. p. 114. *Cliona celata* Grant. This species is correctly identified and evidently is nearly as common in Maine as it is in Massachusetts.

c. Review of sponge papers dealing with the fauna south of Woods Hole, as far south as Beaufort, North Carolina.

In 1921 George and Wilson published (vol. 36 of U. S. Bulletin of Fisheries) an important article on the "Sponges of Beaufort (N. C.) Harbour and Vicinity." Although this locality is less than six hundred miles to the south of Woods Hole, its fauna of Porifera is distinctly different, the affinities being decidedly with the West Indian region. The indications point to a line of demarcation between the two sponge faunas occurring somewhere in the vicinity of New Jersey. What little evidence is available seems to indicate that there may be some kind of a hiatus there, as very few sponges of any kind are reported from the coasts of New Jersey. The paper has nevertheless to be reviewed in its entirety, as in a few cases it is possible that the sponges may also be discovered in the Woods Hole region, while other, widespread species are known from both localities.

The two authors describe 17 species which may be briefly summarized as follows:

1. p. 135. *Spirastrella andrewsii* George and Wilson. This is the common and long known West Indian sponge, much the largest in the world, which is correctly named *Spheciospongia vesparia* (Lamarck). See de Laubenfels, 1932, p. 48 and 1936, p. 140.

2. p. 138. *Cliona celata* Grant. This occurs also in New England, as noted already. It has no value whatsoever in determining faunal territorial relationship, because it is completely ubiquitous. It would

be difficult or impossible to find any marine, shallow water province with calcareous shells of any sort present, where *Cliona* did not occur.

3. p. 138. *Poterion atlantica* George and Wilson. This also is the West Indian *Sphecíospongia vesparia.*

4. p. 140. *Suberites undulatus* George and Wilson. The author of the present paper was unable to find this species at Beaufort during his visit in 1946. From the published description it is not at all clear that it was a *Suberites.*

5. p. 142. *Tetilla laminaris* George and Wilson. This is the cosmopolitan *Craniella crania* Müller, which also occurs, not only at Woods Hole, but in many other parts of the world.

6. p. 145. *Reniera tubifera* George and Wilson. This is the cosmopolitan species *Haliclona permollis* (Bowerbank), and is extremely common in the waters of North Carolina. The species has not with certainty been recorded from the Woods Hole region, but it is preposterous to think that it is really absent from Woods Hole. A description of this species has therefore been added to those given of the Woods Hole sponges. (See p. 11).

7. p. 147. *Stylotella heliophila* Wilson. This is *Hymeniacidon heliophila* (Parker). It occurs also in the West Indies and a very similar sponge occurs in warm waters in the Mediterranean. Other species of the genus are common in cool water in the northern part of the European seas. Most remarkable of all in this connection, is that de Laubenfels, 1936, p. 263, recorded *H. heliophila* from Northwest Greenland. Thus there is every reason to anticipate finding the species in the Woods Hole region, and a brief description of this species is therefore given on p. 18.

8. p. 148. *Esperiopsis obliqua* George and Wilson. This is an abnormal specimen of *Microciona prolifera.*

9. p. 150. *Lissodendoryx carolinensis* Wilson. This is really *Lissodendoryx isodictyalis* (Carter), a sponge typical of the West Indies.

10. p. 152. *Phlocodictyon nodosum* George and Wilson. This is really *Rhizochalina oleracea* Schmidt, a sponge that is typical of the West Indies.

11. p. 154. *Phoriospongia osburnensis* George and Wilson. This is really *Xytopsues griscus* (Schmidt). A sponge typical of warm water marine environments. It was first described as *Desmacidon griseum* by Schmidt, 1870, p. 55, from the West Indies, and is here transferred to *Xytopsues.*

12. p. 157. *Microciona prolifera* Verrill. This should actually be credited to Ellis & Solander, not Verrill. It is a well known form, abundant at Woods Hole.

13. p. 159. *Axinella acanthifera* George and Wilson, and

14. p. 161. *Acanthella corrugata* George and Wilson. Neither of the two species could be found as such by the author in 1946. They were based upon specimens which probably were malformations of some sponge or other, perhaps *Microciona prolifera.*

15. p. 163. *Aplysilla longispina* George and Wilson. This species represents *A. sulfurea* Schulze, a sponge that is typical of warm water marine environments. The sponges of the genus are soft, very conulose, with no spicules, but have horny fibers that often branch, but never anastomose, so that they are like miniature leafless trees (dendritic fibers). Some *Aplysillas* favor cold water, especially *A. glacialis* (Merejkowsky). *Aplysillas* should be sought and may perhaps some day be discovered at or near Woods Hole.

16. p. 165. *Pleraplysilla latens* George and Wilson. This appears to be an endemic sponge, not to be expected anywhere else.

17. p. 166. *Hircinia ectofibrosa* George and Wilson. This is *Ircinia fasciculata* (Pallas), a sponge typical of warm water regions.[1]

In 1947 de Laubenfels published an ecological study of the sponge fauna in Beaufort. He reviewed George's and Wilson's earlier paper, corrected the names, and added furthermore three species:

1. p. 36. *Haliclona excelsa* (Schmidt). The identification is made with some reservation. While it seems certain that the Beaufort species is identical with the one which Verrill described as *Pachychalina millepora,* from Bermuda, it is not completely certain that it is identical with the one Schmidt originally described as *Pachychalina excelsa* from the waters of northwestern Europe.

2. p. 36. *Higginsia coralloides* Higgin. A typical West Indian form which is not likely to be expected further north.

3. p. 36. *Calyx poa* de Laubenfels. Described as new, and so far not known from any other locality. The species may possibly deserve a genus of its own. The name *Calyx* is herewith replaced with *Calyxabra* n.n., as it has been discovered that *Calyx* is preoccupied.[2]

In 1941 M. C. Old published a paper that has significant bearings on the Woods Hole sponges. This is an account of the boring sponges,

[1] The type species of the genus *Ircinia* Nardo, 1833 (*Hircinia* Nardo, 1834) must be established as that described by Schmidt, 1862, p. 34, as *Hircinia fasciculata,* actually a redescription of *Spongia fasciculata* Pallas, 1766, p. 381. As Pallas' specimen is lost, United States National Museum specimen No. 22503 is herewith established as the neotype.

[2] Vosmaer established the sponge genus *Calyx* in 1886, with *Spongia nicoensis* Risso, from the Mediterranean, as the type species. Unfortunately, Ronault had named a genus of echinoderms *Calix* in 1851, and Bigsby in 1868, accidentally spelled it *Calyx,* thereby making *Calyx* a synonym of *Calix,* according to the accepted rules of the International Committee on Zoological Nomenclature.

emphasizing *Cliona celata,* which is abundant in Massachusetts waters (see p. 23). The efficient research of Old shows that rarer species of boring sponges can be found through meticulous search.

Old also detected the presence, in the vicinity of Long Island, of *Cliona lobata* Hancock, 1849, p. 341. This species is distinguished from *celata* by the possession of small spirasters. Numerous authors, led by Topsent, 1900, p. 35, believe that these spirasters are normally present in young *Clionas,* and then, equally normally, are lost. Yet Topsent regards *lobata* as a valid species. If *celata* really ever does possess proper spirasters, they are certainly extremely rare, briefly present, and most difficult to find. It may be possible to identify *lobata* by the abundance and persistance of the spirasters. The megascleres of *lobata* are thinner than those of *celata.*

Old likewise reports *Cliona vastifica* Hancock, 1849, p. 342, from the vicinity of Long Island. This, and certain other identifications in the same paper, may be mistaken. *Cliona vastifica* may be confined to the so-called "Old World." It is brownish red in life, rather than yellow, and this color is retained to a considerable extent even in preserved specimens. Its megascleres are very slender, only 4 microns thick. It has an abundance of microscleres that are often called spirasters, but they are peculiar, scarcely more than short, microspined cylinders, 10 microns long.

Old adds an interesting new species to the American fauna. This is *Cliona truitti,* which is characterized by the possession of megascleres (tylostyles) only 2 to 3 by 250 microns, and—in addition to spirasters as in *lobata*—there are distinctive centrotyloteacanthomicroxeas. *Truitti* is recorded from the Long Island region, hence may be expected at Woods Hole.

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